

AVIATION WEEK

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FEBRUARY 20, 1950



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Airways Assessments

Civil Aeronautics Administration's plan for making the federal airways pay for itself partially pay their own way through assessments on users is being carefully kept under wraps by the House Appropriations Committee, but some witnesses already report "thorough disintegration" with this plan. They complain that "it is essential to prepare as a proposal for obtaining reimbursement" for federal airways for air navigation facilities. In an assessment plan of three years back, CAA demanded the reimbursement of direct charges for use of the agency facilities as "an administrative impossibility" and suggested three types of indirect assessments on additional federal aviation gas tax, transportation tax on passenger and cargo revenues, 10 percent reduction in rates for government traffic on scheduled lines.

Titanium Blades

One of the manufacturing applications in existence of the new wonder metal, titanium, is expected to be in turbojet engine compressors, both in the discs and compressor blades. Since U.S. jet engine manufacturers are already looking at this metal for those uses. It has a better weight-strength ratio than other aluminum or stainless steel, excellent high temperature characteristics and better corrosion resistance than stainless steel or weld. Metallurgists expect that present costs of around \$5 a lb. can be reduced to approximately 50 cents a lb. when a single plant produces as much as 50 tons a day a few years hence. Metallurgy experts envision it as the probable basic aerospace structural metal within 5 to 10 years, both for jet engines and missiles. It is the fourth most abundant structural metal in the earth's crust, next to aluminum, iron, and magnesium.

AMC Outlook

While new Research and Development Contract of the USAF is still in tentative stage, plans are already moving forward to strip Air Materiel Command of much of its research function and have AMC study in government industrial planning and supply. It is understood that the assignment of many of the testing and research facilities will be largely in pass, at least for the immediate future. It may result in the extensive situation of some test laboratories and instruments at

By MATS or Airline?

A recent USAF analysis of movement of military personnel aboard the commercial U.S. air MATS planes may result in discontinuing personnel movement on MATS in this country except for those involving some movement of personnel and equipment. Movement schedule and lack of connecting links hinder efficient travel on MATS in this area to a point where it would be considerably more efficient to use the commercial airlines, even in the future. Any change on MATS schedules in U.S. would not affect routes or frequencies outside U.S.

old Wright Field, now "one B" of the AMC headquarters base, will be under the new command, although physically they still remain at AMC headquarters. Division between commands will be made on a basis of whether the projects are long-range research and development, or are short-range development and testing work which can be immediately applicable to today's USAF. New engineering development center, as a long-range research center, will fit under the new command.

Radar Network Plans

Bids are being accepted by Army Corps of Engineers for the construction of "radar stations" at Fort Lind, near Elmendorf AFB, Alaska, and at Murphy Dome, near Ladd AFB, Alaska, to house radar systems in part of the radar defense across USAF is building on a high priority basis. Cost of installations without the radar equipment is set at approximately \$3 million each.

Watson Lab to Rome?

New installations and equipment to be sent to Gaffi AFB, Rome, N.Y., as reported elsewhere in this issue, are possible part of the long delayed project to move the principal USAF electronics laboratories from Watson Laboratories at Rad Bldg, N.Y. More has been planned for at least two years, but has been delayed repeatedly, first for one reason then another. There are some related ones in the proposed move which make it doubtful whether

the shift will yet be forthcoming for quite some time. Meanwhile, one of the most important fields of USAF research and development is being threatened and being lost that USAF can ill afford to forfeit because of the relocation.

Agricultural Aids

Interest at various aviation fronts in the development of the CAA-sponsored agricultural plane at Texas A&M College, under direction of Prof. Fred E. Wicks, director of the school's personal aircraft research center, is being tangibly represented by donations of equipment for the plane.

Commercial Motors is supplying an E-115 two-loader engine, portable of the new 225-hp rating. Rogers Co., Inc., is providing an Aeromotor propeller, and McGraw-Hill has offered a special design cost price aluminum propeller. Cessna Aircraft has offered to provide a Wittman-type landing gear with engineering to adapt it to the AAM airplane. Vought Brothers Inc. has already donated a 48 C. and portable pilot seat for the plane. An interest will be for supporting aircraft because the plane has been sent by the American Seating Co.

NACA, Ford, Week's continue to plan, is getting into the development, cooperating with CAA and the Department of Agriculture. NACA's contribution will be to make tests of engine test models of the plane to determine the firm in the role of the model, thus giving information at the flow effect on distribution of data and types. NACA staff also will make its contribution to the testing system for the plane in a later date.

Nonstop to Alaska

Importance of the Alaska Defense Command, recent U.S. interest in its leadership in Soviet Russian base, and key to defense against transpolar attack, is again highlighted in discussion that Lt. Gen. Loren Norstad, deputy USAF chief of staff, and top USAF strategic planner, is being assigned to that post soon, succeeding Lt. Gen. Nathan Fanning. Fanning will return to the U.S. for a new post not yet divulged. The Alaskan command is a unified command for ground and air with certain emphasis on air, which is why Gen. Fanning and now Norstad were named assigned at their consideration.



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WHO'S WHERE

Changes

► **New Appointments**—J. M. Spangler is assistant to James G. Smith and Leslie Co. is National Carbon division. B. C. McNeil is named assistant to the president of Kinetic Leasing Co. Peter Ford is vice president of Raytheon Corp. and B. M. Rogers is chief engineer. Thompson Co. appointed R. E. Brown director of research. He was formerly chief engineer, a post held by R. T. Vance.

British General Aircraft Corp. named John H. Rehan general manager of its division at London Airport. Gil Neill has been named the newly created military relations department at Northrup Aircraft, Inc. James M. Hughes will be production test pilot at Northrup's C-125 fighter transport. Cook Research Laboratories appointed Donald McDonald director of its Signal Lab section.

New Britain-Dallas division of New Britain Machine Co. named Ellis Hall a representative in the Chicago area and Gus Giese in its Detroit office. Delbert A. Falmagne is the new Utah State Aeronautics Director, following a series of appointments by the state. Gil Frank R. Cook will guide Minneapolis-Honeywell Regulator Co. as director of new engineering.

► **Sales Shifts**—McKenna-Terry Corp. named John W. Williams general sales manager. J. W. Clarke is now chief manager of Lockheed Aircraft Service, Inc., and its subsidiaries. He'll headquarter in Burbank, Calif. National Airlines, Inc. named William A. Long assistant agency sales manager. He succeeds John M. Buckner, now manager of NAL's advertising department. Howard R. Falmagne is Pioneer Air Lines' new district traffic and sales manager in the Houston area.

Norwest 8000 has been appointed by Western Air Lines as district sales manager for the west encompassing the East Bay area and two northwestern California counties. Joe W. Swisher is new assistant to the president, in charge of sales and contract administration, for Class L. Air Inc. Co.

J. L. Durr is United Air Lines' new sales representative in the San Francisco area. F. H. Clark heads sales for the Standard Control division of Westinghouse Electric Corp.

Elections and Honors

John T. Yippee, Proton product, will champion the system during the 1950 Best Control Firm campaign of Greater New York. Warren Lee Fierman, TWA's head engineer, received the Order of the Star of Defense Medallion in Rome.

Ing. Gustaf N. Venn, chief of USAF's Air Weather Service, will serve as vice chairman of the U. S. delegates to ICAO.

John L. Canale and Edwin A. Link were elected to the board of directors of Refueling Airlines.

INDUSTRY OBSERVER

► Special ground-handling tests on the North American T-28 trainer at Edwards (Mass.) AFB included programmed blowoffs at the base in high speed ground run. During and after blowoffs in each of the three, boosted off by dynamic raps, the two-engine plane demonstrated its ground stability, and advantages of a new automatic nose steering wheel mechanism designed to bank turns, when pilot makes them too steep.

► Second test flight of the YF-96A North American jet fighter scheduled last week at Edwards AFB was to be with afterburner installation on the big Pratt & Whitney J-45. Engine has been run 31 hr with afterburner qualified by test with the afterburner operating only a short time.

► Installation of two target automatic nose and cable in 14 North American B-47 fighter bombers is being completed at Lang Beach, for testing the new Chance Vought high-speed 25-ft target glider. Test cable is hydraulically operated and controlled from the target glider. In the bomber tank has already been run on experimental installation at Edwards AFB, including fighter attacks on the target with its automatic after target is rolled out to operational distance behind the bomber.

► Licensing is getting its O-435A six-cylinder 150 hp engine into export field in addition to growing use of the powerplant in American planes. SAAB Aircraft Co., Sweden, has recently installed the engine experimentally in the SAAB 340 three-place monoplane, an replacement of the former 145 hp de Havilland Gipsy Major 11.

► Two Bell helicopters, sent to Italy for use by the Rockefeller Institute to combat malaria on the island of Sardinia, have since been turned over to the Italian Air Force.

► Lockheed Aircraft will have built more than 2000 jet fighters and trainers of the F-80 type or its developments when it completes present order.

► NACA has decided not to run its big 6 by 5 ft engine test wind tunnel at the Lewis Propulsion Laboratory in 1951. Test again will be side-curtain engine testing, it developed by its test down the vertical subsonic high-speed wind produced in the first high-speed jet engine tests. Sleepy neighbors are not aggrieved by fact that tests are not late at night in Cleveland electric power facilities can make available the 87,000 hp needed to power the tunnel.

► As soon as the Convair-Lear turbo-prop version is ready for selling, prospects for a number of export sales are set. One American export representative says that potential foreign purchases of American transports in South America, Asia and Europe are beginning to look down their noses at conventional powered transports, and to suggest that they would like to talk business again when turboprop and turboprop versions are for sale.

► De Havilland Aircraft of Canada Ltd. has completed arrangements with the British parent company for selling the de Havilland four-jet aircraft transport in North America for approximately \$1.25 million.

► Pratt & Whitney's four-engine TD-23 helicopter design encompasses some features of the two new Navy Sikorsky, the HH-24 (TD 22) and the shipboard HUP-3, but originally aimed to be an alternate for the USAF Arctic rescue helicopter competition, but is now being groomed for the Navy anti-submarine helicopter evolution.

► Air Force experiments with the North American four-jet RB-45 as a reconnaissance plane, equipped with wingtip tanks, may result in the USAF's looking another look also at the de Havilland Gipsy Major four-jet competitor to the B-45, as another likely high speed reconnaissance.

Views Aired on Transport Test Methods

Plans differ widely as pilots, operators, manufacturers, CAB, CAA study problem.

By Charles Adams

Widely differing viewpoints over the best method of meeting higher mechanical dependability as new airlines are becoming apparent in government and industry officials' talks. The problem has an eye to the approaching era of commercial jet transportation.

Crucial of the disagreement is maintenance. Neither the manufacturers nor the airlines will back proposed testing procedures or operations instructions which might add many thousands of dollars to the cost of new transports. The manufacturers especially are wary of plans which would permit governmental agencies or contractors to "sue" to death a new plane and delay its introduction into regular service.

But the Civil Aeronautics Board maintains that a good time to thrust the matter and become not merely new mechanical designs, but actually new mechanical designs, are being tested for production, and U.S. jet airplanes are still in the drawing boards.

► **Comprehensive Approach**—Numerous suggestions for changing present testing procedures for new transports and increasing methods of reporting and increasing mechanical difficulties have been received by CAB. A workable compromise plan is being sought.

Interest in the problem was reflected when a recent CAB meeting to consider means of improving mechanical dependability drew representatives from the Air Line Pilots' Assn., Air Transport Assn., Aircraft Industries Assn., Flight Engineers International, Assn., CAA, U.S. Air Force, Military Air Transport Service, aviation underwriting firms, Senate Judiciary and Foreign Commerce Committees and the Budget Bureau. The group debated their principal plans for supplementing or altering current procedures for meeting mechanical dependability.

► **Cargo Proposals**—One plan, which has several advocates for several years, calls for limiting the use of new-type transports to cargo and mail service for a limited period before placing them in passenger operation. For example, it might be required that before a new

transport plane carries passengers, three units of the type would be placed in regularly scheduled service hauling mail, express and cargo for at least 1000 to each.

It has further been suggested that the rule might require these test units to be maintained in cargo operation for an extended period of time so that their service experience would show that all passengers entering ships by at least an aggregate of 1000 lb. Initial stage of new-type airplanes in cargo service is expected by its proponents to contribute to safety without subjecting fare-paying passengers to the consequences of early mechanical difficulties.

It is assumed that the safety of crew members in the those test cargo-carrying planes could be taken care of by providing them with parachutes and other emergency safety facilities.

► **Phase From Idea—ALPA** is strongly in favor of this new service test program on all new and rebuilt transports. The main reason is maintenance of 1000 lb. of the testing and this would lead to the best test plane alone to an aggregate of 1000 lb. ahead of other transports of this type.

Crew service testing of new transports was outlined by the President of the Air Line Pilots Assn. in its report of January, 1949. The commission cited competitive business factors which result in a strong tendency to put new planes into regular passenger service as quickly as possible. It concluded that experience had shown that test periods have not been long enough to permit mechanical or design weaknesses to be exposed against useful normal operating conditions.

ALPA contends that just before a new transport introduced in regular service shows that "at least one or two planes at least with all aboard before CAA endorsing crews about and many indications are built into the ships before they are released to scheduled operations. If history is to repeat itself, there is a little possibility that one or two Boeing Stratocruisers will be lost before too much time has and no government has been accomplished."

The views assert that the extra service testing would pay for itself. It would the heavy direct losses incurred by the airlines when the Lockheed Constellation, Martin 2-0-2 and Douglas DC-7 were grounded during the past several years and observed that indirect losses from closing crash headlines greatly affected the sale of all air transportation.

► **Losses Estimated**—Four months grounding of the DC-6 when 96 of the planes were in service, or study for it, resulted in a potential revenue loss of over \$45 million to the carrier operation, ALPA noted.

The pilot group and that present Civil Air Regulations provide for about 150 lb. of all service testing, leaving 850 lb. still to go to comply with ALPA recommendations.

At a direct operating cost of \$180 an hour, the carrier and their DC-6 could have been tested for an additional 800 lb. for less than \$240,000. And that cost could be cut down by the amount of cargo revenue received during the test period. There is now a possible air cargo volume to support such an operation, whereas a few years ago there was not.

Additional mail payments made to carriers by CAB as a direct result of groundings totaled over \$3 million in the case of the Constellation and over \$4 million with regard to the DC-6. ALPA also noted that 1000 lb. of shakedown flying would be paid for by its contributors to solving shakedown flying problems which now are in substantial numbers after new equipment is placed in operation. Flight and maintenance costs would have more time to get acquainted with the ship.

► **Criticism Voiced**—James Lusk, technical advisor to the American Airlines, Inc., and his staff had shown that the cargo service proposal is far from a panacea for the bugs in new aircraft.

He conceded that test planes put in cargo service might return more new planes that there might be up to a year's delay in delivery of subsequent planes of the same type while the test aircraft rattled up their 1000 lb. as scheduled test service.

During the test year, the airlines there would either have to suspend the



22,000 HORSES WILL POWER CONVAIR'S GIANT XP5Y-1 FLYING BOAT

First photos of the first powered transport, Convair XP5Y-1, leaving the water on the new Convair XP5Y-1 leaving two sets of three. Made Amphibious operations in carrier service. Each Y-46 is actually a pair of tailfins, mounted one above the other in a single nacelle and driving two shafts, for a combined power of 22,000 horsepower shaft hp. The new Navy search and ASW flying

boat (top) has it built designed as the most developed type of increased ratio of length-to-breadth to achieve greater sea domain efficiency without loss of maneuverability. It is carried with a design top speed of 390 mph, and has a 134,000 lb. gross weight, a 146 ft. span. Plane is working up its water taxi and flight test schedule about Feb. 18, but now reported to be delayed for two weeks or more. Another detail photo below shows (left) carburetor Y-46 in a test run with the colored top of the six propeller blades burning two main engine dies, and (right) detail of the two tail nacelles, with screaming Dutch labels as addition to wing design. Note large delta on which the flying boat will be rolled into the ocean.

be delayed for two weeks or more. Another detail photo below shows (left) carburetor Y-46 in a test run with the colored top of the six propeller blades burning two main engine dies, and (right) detail of the two tail nacelles, with screaming Dutch labels as addition to wing design. Note large delta on which the flying boat will be rolled into the ocean.

be reduced, wouldn't be very effective. During the Constellation's first 35, 000 lb. of operation, 16 critical items occurred. But in the next 35,000 lb. there were 30 critical items, indicating that there is no predictable conversion rate in mechanical troubles on new ships.

Further, when the DC-6 was grounded after five in flight loss in 1947, they had accumulated a total of 60,500 lb. of flight time, and the oldest one had been in service nearly 32 months, few of which involved intense proving tests and even the carriage of passengers. Only at the end of this time was it discovered that gasoline which overflowed while being transferred in flight between auxiliary tanks could enter the engine burner combustion

chamber a fire.

► **Equivalent Procedure**—"My thinking," Lusk declared, "is that more service testing is not necessarily going to be practical and maintenance as it will be when the ship which already exists between the cost of planes and the price that can be paid for them. The best place to receive bugs is on the drawing board or in the test laboratory. It is also the most expensive method."

His real experience showed that 1000 lb. of service testing provided "only a trifling amount of safety." Some bugs don't turn up for three or four years. They are still appearing in DC-1 in several million hours.

Some units of new-type airplanes go along 1000 lb. without major trouble,

Side effects in the same areas show bags strongly in a few lines. In these situations, it would be responsible to subdivide a large fleet of aircraft by nonusage into two steps: 100% by an advantage.

Semiconductor-COA pointed out that the fleet of aircraft for the semiconductor cruiser actually have nearly 100% of testing before the last one is placed in regular passenger service. This includes 40% of manufacturers' tests, 75% of COA tests, and 200 h of service in the fleet. The fleet of aircraft for the 105 h of service, and over the entire while the planes will be operated.

But COA believes even the 775 h may not be sufficient time. It knows that all the bags won't be found in 775 h, at an 2000 h. It would like to see the fleet of aircraft for the same reason. But, they now agree.

One CNA official praised the idea of containing accelerated service tests at these planes for 1000 hr each. He said 9000 hr would be even better.

• **Flight Engineers' Complaint:** A representative of the Flight Engineers International Assn. said his group certainly favors a reasonable test period but couldn't say whether that period is 280, 500 or 1000 hr. "It has been well demonstrated that troubles do not come up early enough in a plane's utilization so that we could economically prescribe a test period," he declared.

have always believe that the only way to enter the service testing process nationally, would be to have the government step in and bear the costs. But the Budget Bureau and the military have shown an enthusiasm for an expensive commercial prototype development or testing program.

Countermeasures Suggested—Another proposal advanced at the industry meeting for improving the methanol desalting ability of new aircraft provided that a separate safety sensor regulator¹ be established for each basically new process involving the use of methanol. According to the Mexican government, the countermeasures would dissipate all these time to work. Their only purpose would be to adapt the all appliances at the production type from developing substantial hazards in services which might compromise operational safety.

Aircraft company engineers, airline maintenance men, pilots and government representatives would be on the countermeasures, which would be functioning on some 10 to 20 minutes of the flight, as soon as it becomes evident that the methanol desalting plant was to be built. The group would have access to all such airplane parts to components at the factory and later at the operating base.

The committee would keep a detailed record of all importations, slaves and women taken, and would quickly notify

A black and white illustration of a biplane flying over a landscape. The biplane is a single-engine aircraft with two sets of wings, flying towards the right. It has a propeller and a tail section. Below the biplane, there is a car and a person standing next to it, looking up at the plane. The background shows a hilly landscape with some trees and a small building.

RESCALE COMPETITION WINNER

First picture of the new Turok. An F-16 fighter helicopter designated H21, whose is the second USAF Aerobically powered aircraft (as reported in AVIATION WEEK, July 13) shows off its new features: a new design plant. The aircraft of version accepted is a Wright Cyclone 3400-75A engine rated at 1125 hp for takeoff, instead of the 800 hp version previously disclosed. Engine is interchangeable with power plants of the Comanche 3A in its various assemblies. Landing gear is an improvement.

contents of the wheel and a substantial system bag that which Passco calls "assembly kit." Swinging leopards hunt to secure work is controlled by capsize bar control. Besides passenger door there is a rear cargo door on left side of landing. More detailed information is available on the contact indicates a purchase of 12 helicopters for \$11.3 million. Advantage of the contract is expected to give Passco a headset, controls, and engine maintenance of large helicopters as the commercial as well as military field.

all parties concerned when possible steps were necessary. It would follow the notification by coordinating the removal action taken by the airline and manufacturers. The group would liaise until such time as it was found that the particular type airplane involved by its nature a high degree of uncontrolled descent liability.

■ **CAB Staff Idea**—Technical staff at CAB was instrumental in advancing the plan. But the manufacturers, CA and some of the workers have demonstrated little confidence in it. Several workers would favor the committee approach if the group included only union and manufacturing representatives and was not government-controlled.

Aircraft Industries Assn. is particularly opposed to the safety service revenue idea and calls it "unworkable." It notes the possibility that this group of specialists would be able to control the new phase project almost from the start as was indicated, and could second-guess, delay it, and add costs all along the way.

• **No Responsibility**—AIA thinks the group would be in a position to recognize and not have any responsibility for things that did not go the way they should have. AIA believes its operations on the coastline would be no more capable than those now working on the coastal plants.

CBA organizations pointed out that in type certification, boards perform much the same function as the proposed safety review committee. Their type certification boards continue to function after the new aircraft is certificated and goes into scheduled operation.

* **Reporting System:** Third proposal considered at the Washington meeting involved establishment of mobile "safety system," which would utilize the full cooperation of noncertified operators and CAA as a safety program based on full reporting of violations. Difficult, efficient analysis and a separate remedial action. AIA finds this approach, pointing out that side is a continuing process depending upon assimilation of experience under a verified operating conditions over long series of time.

These safety systems basically now follow the same principle used now in the daily mechanical-based opening act, except that more stress would be placed on direct cooperation between the operator and the manufacturer. Now a year old, the present system is solving daily reports of mechanical difficulties by such actions to other cases. CAA and the manufacturer. All parties concerned should know of a trouble within 24 hours.

That procedure has worked out well, and the military has adopted a similar plan.

\$500-Mil

**Pacific and
works cash**

A \$29-million expansion at Edwards Air Force Base, Calif., is largest USAF contract in the \$500-million range. The work is scheduled for early

In line with the speed building of U.S. Pacific area, the new west \$100 million and Air Force construction, Guam, New Iona Island Congress million in Alaska works last fall as the the Pacific states' opportunities to increase are anticipated.

Matic experts
550 in new Air Force
ing experimental po
unconventional fuel
sails and telescoping
rummy and luxury,
billion-and \$144.8
went to the Army m
nity at the base

[illegible]

\$500-Million Program up to House

Pacific and West Coast areas to get large share of public works cash; Murco listed for \$29 million.

• **Lake Denmark, N. J.**, Naval Aeronautical Rocket Laboratory, \$7,500,000 for rocket test and development facilities.

- **Wallops, Wash., AFB**, \$6,845,000, including fuel expenses, to build permanent aviation fuel storage facilities.
- **Wallops AFB, N. Mex.**, \$6,671,600, including aviation fuel storage facilities, air field improvements.

- **Johnsville, Pa., Naval Air Development Station, 85,253,500**, for extension of runway for jet operations and test facilities
- **Indianapolis Air Transport Station, South Andre, 14,000,000**, for additional USAD facilities

Other USAF facilities systems/ improvements must be provided before construction can move forward, says

- **Engle AFE, Tex.**, \$4,717,000, for aviation fuel storage and related payments
- **Compass AFE, Ky.**, \$498,000 including electrical parts and services items
- **Cattle AFE, Calif.**, \$6,171,800, including related improvements and aviation fuel storage facilities
- **Enbridge AFE, Ill.**, \$3,400,000, including

- **Edwards AFB, Tex.**, 517,972,000, including aircrafts engineering test facilities.
- **Ellington AFB, Tex.**, 537,800, for orbital weapons testing buildings.
- **Guthrie AFB, N. Y.**, 35,114,500, including laboratories for automatic radar and direction finder.
- **Hanford AFB, Calif.**, 51,792,000, in addition to existing high energy facilities.

- **Hood AFB, Tex.**, \$1,369,467, including control tower and air and crash status, night lighting, strobe/obstruction lighting, fuel storage, airfield improvements
- **MacDill AFB, Fla.**, \$4,612,006, including design facilities and airfield improvements
- **McGuire AFB, N. J.**, \$790,800 for fuel storage

If Late . .

If the case of AVIATION WEEK is truly as troubling you, the delay can be attributed to a disruption of mail schedules by the railroad's cancellation of trains as a result of the coal strike.

• **Over APB, Min., \$1,150,000, for furniture and lamps**
 • **Schwartz APB, Min., \$600,000, for major and useful improvements**
 • **Foreman, Ctbl., \$250,000, for improvements**

5 Wright-Farmer AFB, Ohio, \$3,340,000 including equipping laboratory building, computer test building, wind tunnel and related addition to motor test building, heating and building.

24,200,000 for strategic bulk petroleum storage facilities at an undetermined location in the U.S.

USAF is authorized \$7,998,000 for conversion of engine overhaul unit facilities, \$10,825,000 for engine overhauling unit and communications facilities, \$1,000,000 for airfield lighting improvements.

Other major programs include the National U.S. ISAP is authorized \$37.74 for weather broadcast system to govt. communications facilities, \$2,800,000 for railroad loss, \$453,700 for ground control approach facilities, \$2,876,982 for ground radar stations, \$2,494,321 for base multifunction single side band stations, \$261,544 for radar aid facilities.

Chamcoctapee Naval Aviation Ordnance
Repair Station, Va. \$1,317,000, includes

Indianapolis NWS, Ind., 54,518 080 to monitor
partly of wind tunnel.

Minerals: NAR, Calif., \$2,250,000 for major and change contract
Natchez: NAR, Va., \$405,000, by two bids for turbine engines
Prest-Lite Nerd Electronics Laboratory: \$1,334,000, for laboratory and office building

Quantum Power NAS, R. I., \$300,000, for completion of two engine test cells

San Diego NAS, Calif., \$130,000, for deep-freeze engine test cells

Wallops Island NAS, Wash., \$21,000

Windsor Harbor Nantux Communication Systems, Inc., 3100 Bldg., including remote-controlled high frequency direction finder facilities.

Homeworks Eval Model 100 EXCEL-100000 813.0000 etc

was designed and built by George Earl in view of filling station he operates in Bloomington, N. J. Constructed of spun aluminum parts, and handcarved ash/teak veneer, craft was designed to sell in the

810,000 rhm. EXEL-copter is powered by 300 hp. Fuselage, main rotor diameter is 18 ft.; tail rotor 6 ft. 3 in., fuselage length 19 ft.; weight empty 950 lb., loaded 1400 lb., capacity of the craft is pilot and one passenger.



ROCKET SLED with subject loaded for crash impact test. Unlike the India sleds are suspended before takeoff stage. Volunteers can control and telecommunicate to push up their reactions. Four subjects follow enough thrust to push sled . . .



AT 240 MPH, SPEED down 1800 ft. track. But with volunteers, 1700 ft. sled never has exceeded track more than 150 mph. Run as fixed, in active control track by space-time recording system which operates through cables stretched along track. Sled . . .

'Crash' Sled Aids Impact Studies

As First volunteers, leaving down a 2000-ft. railway track, as a rocket propelled sled at speeds up to 150 mph, and then coming to an abrupt stop, are representing to find out how much crash impact force the human body can take and still survive.

The tests are being conducted at Edwards AFB, Calif., and already have proven that persons, properly supported, can take deceleration up to 34 Gs and peak forces up to 37 G without harm.

The experiments point to the fact that the human body, in the right circumstances, is much tougher than is generally believed—backing up findings

of Cornell University's crash injury research project which is studying light plane crash survival chances.

• **Team**—The volunteer AF team, consisting of three officers and two enlisted men, is headed by Major John P. Stepp, flight surgeon and second-in-command research scientist, who took the first ride in the rocket sled. Before this, all experiments were with a dummy and not without incident—it came back from an early type harness and catapulted over 700 ft ahead of the sled with its underbody trailing behind.

After determining tolerances of the human body's resistance to impact forces, major aim of the group will be

in aid and development and test of equipment for protecting crews and passengers involved in crash landings and ditchings.

On another railway track at Northrup, the sled is two miles long—often runs at speeds up to 1100 mph, are being run on a metal sled which is equipped with an ejection seat and dummies. These tests are to determine the speed limits of present type seats and to find out what added force protection the pilot may require when he's ejected from an aircraft traveling at supersonic speed.

All test equipment was developed by Northrup Aircraft, Inc., and is being operated by company personnel.



DECELERATES IN 1/2 sec when it hits 50 ft. barrier into impact frame as required to show in actual crash landing. Maximum reached with volunteers is 32 Gs—downing

from 150 to 75 mph as it—on crash ground—stated behind showing test effort by change in power and using different angle surface of force . . .



WITH POWERFUL BRAKE, the deceleration can be controlled from 5 to 80 Gs. Hydraulic, drag-type brake shoes, 180 in. d., on cost \$3,000 to three each.



STRESS ANALYSIS OF HUMAN BODY under impact is made possible by sophisticated telecommunicating equipment which

transmits to control room signals from stress gauges attached to volunteers. Accidents occur data also are transmitted by radio.



CONTROL PANEL, in town over track, has many switches, potentiometer settings to be checked over after each test are finished.



AT PEAK ACCELERATION, subject's head and body are thrown back against seat. Volunteer is Major Stepp, at stage of test.



IN 35 G DECELERATION, Stepp, patches forward violently against harness. Dives to double around G forces during impact.



SUPERSONIC SEAT EJECTION experiments are conducted in the 2800-ft. sled, using a two-mile, precision-built track.

Five rockets, producing 21,000 lb. thrust each, are used for speeds up to 1300 mph. Forward-firing rockets slow up sled after . . .



DUMMY IS CAULFALLED with seat harness and telecommunicating device around trajectory. The shows a radio test.

Ambassador Tried In Asymmetric Tests

Recent asymmetric flight trials of the Ambassador, twin-engine transport developed by the British firm, Airspeed, Ltd., have revealed performance capabilities which should prove of interest to U.S. aircraft operators and designers.

During a V_{max} (maximum control speed while airborne) test, the lowest speed at which the Ambassador could be kept in wings-level flight with the right engine windmilling and the left at idleslow power, was 55 knots. When the left engine was cut and right engine was at idleslow power, speed could be dropped to 35 knots. This was further reduced to 33 and 30 knots with a 5 deg. bank, as permitted in British Civil Aerodrome Regulations.

In V_{max} (maximum control speed as at take ground) idleslow experiments, with flaps at idleslow position, the low-speed could be fully controlled at 50 knots after cutting one engine. Allowing for a "factor of uncertainties," this speed was set at 105 knots for right engine failure and 97 knots with the left engine out. With right engine out, heading was maintained and the plane smoothly climbed away. With left engine cut, however, the Ambassador was

kept on a slight heading, but dropped considerably to the ground before climbing away at 105 knots.

According to reports, the Ambassador, at its present maximum gross weight, has a basic maximum control speed of 105-90 knots (E.A.S.) and a safety speed of 160-185 knots (E.A.S.). Safety speed is defined as one giving a "reasonable margin over maximum control speeds and over engine-out stalling speed." The craft is said to be quite safe and controllable down to an actual stall when flying on only one engine.

British maximum control speed tests through which the Ambassador was passed, are, as opposed to safety speeds, set up to determine briefly the lowest speed at which it is possible for a pilot of normal skill and strength to recover and keep full control of a craft after failure of engine(s). It sometimes is quoted lower than the stalling speed for a given gross weight of an aircraft during these tests, but very rarely, while stalling speed is given for a plane at maximum gross weight.

Comments for the tests, split into three groups, are: V_{max} —controls could be at idleslow setting with landing gear retracted; V_{max} —idleslow settings, but one could be down; V_{max} approach and landing—all controls are set for final approach, and it must be possible to

clear suddenly any or all throttles and open throttle(s) instantly to full power and maintain on holding side difficulties.

Airspeed reports that during maximum speed checks with the No. 2 Ambassador prototype, no lower than 115 complete stalls were made in one day by C. S. E. Thompson, the firm's chief test pilot.

In these stall checks, made at maximum gross weight, the craft's e.g. was shifted, step by step, through the whole range from 14 to 30 percent. At each e.g. position, the craft was stalled 3-4 times with flaps in all settings. Stalls were started at 11,000-14,000 ft altitude and ended at as little as 1,500 ft.

The Ambassador is said to be so stable when fully stalled, that test pilots "do not breath easily in consciousness conditions, still the aircraft through the deep drop itself" at a rate of descent of about 2,000 ftpm. This descent speed reportedly can be maintained with the control column all the way back with trim assisted by instant of release.

The same technique was used with the South S.E.P. rate pilot in design. With a maximum roll displacement of 4 deg., the transport's desired under automatic control averaged 1,600 ft per sec at a forward speed of 85-95 knots.

AVIONICS



New rate of traffic flow depends on neighborhood scenery.

Solution To Airport Traffic Jams

New radar range system shows promise of providing fine positional accuracy within 30-mile radius.

A new radar range, which shows promise of outgunning bad weather traffic jams and boosting landing rates in airport terminal areas, was revealed by the Sperry Corporation at its recent 10th annual meeting of the Institute of the Aeronautical Sciences, in New York City.

The new device, described by George Lickford and Joseph Lyman as a precision non-directional radar range for the terminal area, is currently under development by Sperry Corporation Co. for the Air Force's All-Weather Flying Division and Watson Laboratories.

► **End-on-end-on-end** concept governing its design is that the maximum rate at which air traffic can flow in terminal areas depends upon accuracy of the navigation system in use. If the system is not to be a limiting factor of traffic capacity, its accuracy must be great enough to exceed requirements for peak traffic loads.

Much of the early opposition to choosing the R-THETA or polar coordinate class of system stemmed from the lack of azimuth accuracy which today still is outstanding deficiency.

Accuracies reported for the precision system are better than ± 3 deg. and much higher accuracy was thought to

be possible with further development. Full capabilities of the new system will not be known until the All-Weather Flying Division runs a complete flight evaluation.

The present speed of 120 mph, it takes at typical heights in a conventional figure and approximately present aircraft configurations.

The first assumption provides an average time interval of 10 sec. between arrival. For 120 mph, that equals 1 mile.

For these assumptions to hold, certain criteria must be met:

- Positional accuracy of the system must be within ± 150 ft. This is the accuracy to which both the pilot and the ground controller must view the instantaneous position of the aircraft.
- Aircraft must pass the every point of the approach within ± 1 sec. of schedule to hold the 30 sec. spacing between aircraft.
- Aircraft must enter the approach with a heading accuracy of ± 3 deg. to eliminate bracketing.
- Approach ground speed must be held to ± 10 percent or ± 14 mph, if the 120 mph speed is used.
- Radius of the terminal area or zone through which control must be effected must be 10 miles.
- **Basic Considered**—Ground sufficient positional accuracy, ground speed can well be maintained now controlled. Consequently, achieving accuracy cannot be combined. Losses in accuracy

Antenna for new, precision anti-range

An examination of the present air navigation and traffic control knowledge indicates that no one really knows what accuracies are required to achieve a particular landing rate, nor just what landing rates are feasible. Factors other than accuracy are also involved. The problem is included in Air Navigation Development Board study program currently underway to determine what factors limit landing rates and traffic capacities of airports and enroute systems.

► **Recent** landing rates seem to be approaching 20 aircraft per hour. The 10 aircraft per hour rate, set as an objective of the terminal system, is considered reasonable, however, this figure is an estimate.

► **Example**—In describing the need for a precision radar range, Lyman and Lickford show, by means of a numerical example, how accuracy of a navigational system may affect the rate of traffic flow. Two assumptions are made:

- **Design** capacity of the system shall be 120 aircraft per hour.
- **Final** ground speed along the approach path to the runway shall be 120 mph.

The 120-aircraft-per-hour rate, high as it may seem, is the design rate necessary to handle 35 aircraft per hour, without large delay. Two Australian, British and French pilots show that the working capacity of a system can never equal the design or maximum capacity without delaying all aircraft substantially.

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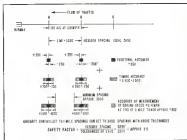
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Added tolerance of two-antenna on first approach

trail to increase the spacing at which accuracy can be operated safely and thereby decrease the landing rate.

Effects of these errors on landing rate are illustrated. The primary ambiguity that aircraft may be anywhere within a 390-foot square is due to positional error. Added to this is the schedule error. As rate of 310 ft/sec, flying time of 150 ft is roughly 0.5 sec. This plus positional error brings the accuracy along the flight path to 470 ft.

Ground speed accuracy is strongly dependent on positional accuracy. For ground speed to be measured to ± 2 percent, the track length which contains at least 25 elements of position error (470 ft \times 0.02) is 10 ft. At track 12,000 ft or approximately 24 miles long counts. Any accuracy necessary to speed trail to lengthen the track, thus, no surprise could be taken if this distance at 120 mph, a basic rate of approach, is 150 ft or an inaccurate simply because ground speed cannot be measured to better than ± 2.4 mph. Adding this error to the other spacing error brings the total accuracy along the flight path to 1200 ft.

This total error of 1200 ft, means that aircraft approaching 5700 ft/sec, must close up to it in 10 sec.

These additive tolerances along the first approach path indicate that a schedule of approach of 150 ft/sec (1528/2300) is a schedule. If the additive

tolerance of two aircraft between any 1 to 15, a reference can result. If the additive tolerance are wide enough in comparison with the ground spacing (large safety factor), safe operation is assured.

If it is desired to increase the safety factor, it is necessary to:

- Decrease landing rate
- Increase positional accuracy
- Increase scheduling accuracy
- Increase ground speed measurement accuracy

According to achieve the control as currently described, the control space must extend considerably beyond the entry gate to the final approach. It seems reasonable to require that the guidance system must have ± 250 ft positional accuracy out to a radius of 20 miles because:

- It takes flying time (and therefore distance) to compute the flight tracks, ground speed, and schedule accuracy.
- Being simply through the entry gate at the spacing required for safe operation and yet close enough to achieve the assumed landing rate. Additional time is required for position control functions, such as changing altitude and speed, etc., necessary to maintain the computed schedule.
- Accurate knowledge of position in the plane requires far perfecting these scheduling and control processes.

Thus, it appears from that positional accuracy of the navigation system does with others the amount of safety that can be moved safely and experimentally to the forward end.

The nature of air navigation and traffic control requires measurement of

two parameters—distance and angle (azimuth).

Several methods have already been devised to measure distance with satisfactory operational accuracy (in the above case ± 250 ft).

Lack of accuracy in measuring angle or azimuth, however, has been the principal deficiency in the use of 11 cycles.

An accuracy of ± 0.1 deg, it required in order to achieve ± 250 ft positional accuracy at 90 miles.

Accuracy Measurements—As azimuth measuring technique has been developed in which accuracies in the order of ± 0.1 deg have already been demonstrated and which appear to be capable of extension to give still higher degrees of accuracy. The new technique is an equivalent of the standard measuring principle, devised some years ago by Dr. G. C. Loebl, to measure the frequencies with certain fundamental and important changes and additions.

In the basic range technique an antenna having a resonance (beat duplet) pattern is rotated so that its field strength at any point in space varies at a sine wave.

The sine wave modulation (now produced in the case of the frequency) is the reference speed of rotation. The phase of the sine wave is directly proportional to azimuth angle directly from the antenna station.

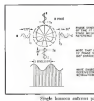
If the phase of the signal is compared with reference signal of constant phase, azimuth can be determined. If the reference signal is synchronized with true north, the phase difference between the two signals gives azimuth.

Now, the degree of phase between one degree is small.

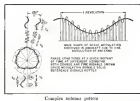
In this simple technique, azimuth accuracy is limited to the accuracy of timing techniques for measuring the true phase. If some method or gear drive greater phase per degree of accuracy can be employed, azimuth accuracy can be improved fundamentally.

Pattern Superposition—This is relatively simple to achieve at maximum frequencies. As the frequency of 11 cycles or 11 cycles on a scale can be employed like, 11 cycles will produce 11 cycles of sine wave at any point in space for any complete rotation, and the phase shift for maximum phase difference is greater. One degree in phase equals $1/11$ deg of azimuth. This measurement, however, has 11 points of ambiguity, since individual cycles, which correspond to the lobes, are not counted.

This ambiguity can be removed with the improved accuracy still retained by superimposing the 11-lobes pattern on the original single lobe pattern. This causes a lobe with slightly different phase angles, being equivalent to one of the 11 lobes.



Single lobe antenna pattern



Complex antenna pattern

The 11 lobes will produce 11 cycles of sine wave in each revolution of the antenna, but the average value of the 11 cycles over varies according to the sine wave produced by the basic sine wave pattern.

This variation due to the basic sine wave is possible to identify each of the 11 cycles. The two sine waves produced act as "cosine" and "sine" signals for each antenna measurement.

As the present system design, it contains a "cosine" sine wave frequency of 27.5 cycles for the cosine and a "sine" frequency of 38.5 cycles for the 11 lobes.

Constant phase reference signals of the same frequency are broadcast in all directions so that the phase of the antenna signal can be compared with a suitably selected reference to obtain true azimuth.

The entire system operates on a very narrow band carrier frequency in the 5000 megacycle (Mhz) series. The system also is designed so it may be extended to other uses in a very simple manner, such as navigation and traffic control, without affecting the accuracy of the system at the possible effect of reference from terrain and other objects.

Also at the maximum frequency used in this system, it is known that zero antenna accuracy can cause some error in azimuth measurement. At the present time, however, there are no of measurable magnitude concerned in possible measurement error.

Flare of reference can be largely avoided by virtue of the short wave length involved. At 5000 Mc it is possible to control the vertical radiation distribution. The antenna is mounted at sufficient height above the ground to avoid interference from the ground.

The reference signals are broadcast on an frequency measured on the 5000 Mc carrier.

In the actual receiver, four signals are received: "cosine" and "sine" and "reference" and "reference". The cosine and sine signals are compared in two phase detectors. The cosine and sine reference signals are also fed through two phase detectors before serving as the phase detectors.

The output of the phase detectors is used to form the phase shift until the two reference signals are made to equal the variable cosine and sine signals.

The amount of shift necessary for this system to the output reference of a microammeter and represents the cosine and sine components of the signal's magnitude.

The large difference in phase, the phase difference can be controlled by the cosine signal. But at the phase difference approaches zero, the sine signal takes over and effects the final control of the system. The cosine signal is effective only in determining azimuth. Azimuth, the cosine signal is controlled almost at the time directly by the sine signal.

Flare of reference, which is further improved by the accuracy of the system at the possible effect of reference from terrain and other objects. Also at the maximum frequency used in this system, it is known that zero antenna accuracy can cause some error in azimuth measurement. At the present time, however, there are no of measurable magnitude concerned in possible measurement error.

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Thus, very little power is detected below the horizon where it can strike the ground or any buildings. Reflection effects are almost completely eliminated at all angles greater than 4 deg above the horizon. This represents an altitude of about 1600 ft at the edge of the control area.

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'Big Four' in Lightplane Industry

Reports by top quartet among 10 companies still in personal plane business reflect financial health.

Despite the severe deflation experienced by the lightplane industry, a number of key companies in the group have managed to survive and account in good financial condition. Recent financial reports reveal the relative financial health of the larger remaining units.

The lightplane or personal plane field has remained a small, though significant, industry as 1944, at least 10 companies were manufacturing lightplanes. Now there are only 10. Four of these remaining companies, whose reports have been released recently, afford revealing subjects for analysis as to their ability to meet current requirements.

During 1944, according to the National Aircraft Council of the Aircraft Industries Association, the lightplane industry had total shipments valued at \$14,102,000. Of this total, 60.5 percent was accounted for by four companies, as follows:

Beech \$1,779,800

Cessna 1,445,000

Piper 1,384,000

Boeing 1,316,000

► **Beech-Aircraft**, the first to report was Beech-Aircraft Corp. For the fiscal year ended Sept. 30, 1944, Beech reported total sales of \$20,583,649, compared with net sales of \$24,145,226 during the previous year. With a lower backlog now available it is likely that sales for the current fiscal year will be below that of 1944. At last reports the company's backlog consisted principally of contracts calling for the production and overhauling of Beechcrafts for the Navy, airplane parts for the U. S. government and aircraft sold to individuals and government. It is significant that first orders for about 100 of the new Model B35 Bonanzas have been received, with spring deliveries expected this year.

► **Cessna-Cessna Aircraft Co.**, which led the lightplane industry in dollar value of sales during 1944, also reported its net revenue of \$13,136,025 for the previous fiscal year. Based on the 99,885 shares of common stock outstanding, the 1944 fiscal year earnings amounted to \$1.54 per share. During this period, total dividends at \$1.00 per share were paid out to stockholders in equal quarterly distributions.

Further announcement from Sept. 30 and Dec. 31, 1944, is expected in the Beech consecutive balance sheets. The latter report shows net current assets of \$6,184,165, equivalent to \$33.55 per share. Also, net worth was \$8,766,993, or \$45.32 per share. The market valuation for the current period now down to \$19,072, in contrast with \$434,870 down in the like quarter the previous year. As a result of declining earnings, Beech declared a dividend of 20 cents a share payable Feb. 10,

1944, instead of the 25 cents rate advanced in previous quarters.

Now backlog looked buoyant sales during the December quarter. As of Sept. 30, 1944, unfulfilled orders were estimated at about \$13 million. On Dec. 31, 1944, the company's backlog was stated at approximately \$11 million, indicating an excess of \$1.1 million from its business over deliveries during the quarter.

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Completed in July, 1943, Cessna closed up its bedroom and dining room furniture for only in the commercial market. Preliminary reports indicate a successful reception for the company's line.

Cessna has also developed a line of hydraulic cylinders for farm tractors and implements. Significantly in both 1944 and 1945 Cessna's aircraft and non-aircraft sales were almost evenly divided in the company's total bookings. Cessna takes pride that it has paid annual dividends for nine consecutive years and, of course, shows consistent earnings during this time. The most recent dividend, 25 cents per share, was paid last December.

► **Piper-Piper Aircraft Corp.** through a series of recent capital adjustments, remains a major factor in the lightplane industry. For the fiscal year ended Sept. 30, 1944, the company showed a net loss of \$75,113. This was after a credit adjustment of \$136,890 on the evaluation of surplus inventory. Note holders also received dividends in the amount of \$17,515.

Following stockholder approval in November, 1944, the preferred stock rate value was reduced from \$10 to \$5 per share. This made possible the re-adjustment of a contract to sell (surplus) in the amount of \$798,890, but provided no additional cash for the company. As of Dec. 31, 1944, Piper had a net working capital of \$257,800 following a net loss of \$111,078 for the quarter. After giving effect to the 120,800 shares of preferred stock not classified, the available net worth amounted to the common stock, as of Dec. 31, 1944, was \$1,446,695 or about \$1.70 per share.

► **Boeing-Boeing Aircraft Co.** has reported net revenues of 90 cents per share for the year ended Dec. 31, 1944, virtually unaltered in the 91 cents per share shown for the previous fiscal year. The company has 127,675 common shares outstanding but has reported no increase in share price in recent periods. No current balance sheet available has been advanced, only the 1944 fiscal year ended Dec. 31, 1944. At that date the company showed net working capital of \$1,255,499, or \$8.21 per share. The company, however, now heavily indebted in liabilities at that time. The netted in losses was \$10.94 per share. As the company had a dividend of only 15 cents per share last year, an obvious improvement in the company's position of Boeing Aircraft is indicated since Dec. 31, 1944.

While each of the four personal aircraft companies issued their various degrees of financial health, all of these now are expected to continue to be successful in the lightplane market in the immediate future.

—Selig Altschul

NEW AVIATION PRODUCTS



Megohmmeter

New portable-operated type of "Megger" for use by electrical maintenance men and repair shops is offered by **James G. Biddle Co.**, 1314 Arch St., Philadelphia 7.

Unit (shown) is designed for testing condenser circuits, lighting and power installations, generators, cables, and experimental and laboratory equipment.

In this device, hand generator is replaced by a powered, constant of constant voltage step-up transformer and schematic circuit, offering constant d.c. test voltage.

A d.c. unit also is available with hand-cranked motor, for use in field. It consists of the "Megger" type constant-voltage test unit and a separate motor supply, 3000 dc. from any 115v. ac. 60-cycle outlet. One end from the hand-crank instrument and another from the motor to an a.c. outlet classifies hand operation.



Blind Rivet

A new series of rivets that can be installed by using an ordinary hammer is announced by **Cherry Rivet Co.**, 213 Winton St., Los Angeles 13, Calif.

Called Cherry Rivet Blind Rivet, this new concept of two-piece blind rivet member with the hole tapered toward the bottom, and inserted down per se, is put into hole in rivet. Rivet itself is set longitudinally by two right angle cuts.

Hammer blow covers pin to conduct

the tapered section of the hole, then expand four sections at end. Joint is stated to be tight and have high resistance against loosening.

Use of closed die dies, and use of special tools, installation of drilled hole and efforts toward material thickness tolerance. Rivet is reported to have necessary strength and tensile strength to meet various requirements, and perform self-welding rivets than rivet sheets are fastened to heavier sections, or heavier pipe sections in each other.



High-Heat Switch

High temperature thermal switch, designed for use in jet engines, rocket motors and electronic controls, is offered by **Control Products, Inc.**, 306 Essex St., Haverhill, N. H.

Switch ranges down 0.0100 F. usually apply. Manufacture claims device has ability to maintain temperature calibration for 340 hours at 1500 F. within ± 10 F. Unit weighs 54 gm., pulled in 1 in. long. Switch operates on incompressible air. Plug or screw type mounting is optional.

Airport Spot Lamp

For airport lighting and signals, 800w., N-43 reflector spot lamp, made by **General Electric Co.**, Natick, Cleveland 12, Ohio, is designed to provide brighter, longer-range light beams than can be obtained with flood lamps. GE engineers report that spot distribution of light has been made possible.

"In the first time in a hand-lamp as a factor lamp by the development of a practical method for lightly lighting the wide surface of the beam." Heavy lighting results in a flood pattern, and so focusing at all cases difficulties to appear in the beam, they explain.

With 5-in. dia. lens, lamp has beam diameter of 100 ft. at 1000 ft. distance. Beam of special glass that is claimed to be capable of withstanding thermal shock from drops of water, oil and grease, such beam effectively drives similar beams without the special glass. May be used here provides greater strength than does ordinary lens.



Metal Shock Mount

Unit shock, resists, supporting Metal-Plated cushion made of shock and thrusts, now are being produced by **Robinson Aviation, Inc.**, Newbury Air Terminal, Teterboro, N. J.

These all-metal mounts are said to offer advantages over other types of metal, since they are not affected by stresses of temperature and do not deteriorate because of oil or moisture.

Radiant material is inherently damped, load-bearing and stated to be durable beyond requirements of government and commercial specifications. Shock or pressure in air, it is a high-heat High damping action is provided through internal friction of Mill-Flux cushion, reducing amplification at resonance and offering greater structural stability in mounting system.

Previously Robinson used Metal-Flux only in its large Vibro-shock mounting units.



Indicates Temperature

New, high-temperature-rated pellets to indicate 2100, 2300, 2400, and 2500 F., have been developed by **Temco Corp.**, 142 West 22 St., New York 11.

Units now in stock (125 113 F., in 124 deg. steps to 400 F., in 50 deg. steps to 2000 F., and in 100 deg. steps to 2300 F.)

Master of its supply pellets described Feb. 6 in this column is **American Aviator Corp.**, Miami, Fla., which was inadvertently designated American Aviator Corp.

WHAT'S DOING

at Pratt & Whitney Aircraft?

We've just been reviewing some figures to see what happened at Pratt & Whitney Aircraft during 1949.

One thing that happened was that we continued to build and deliver substantial quantities of aircraft engines. During the year, we were in production on six basic sizes of piston engines for both military and commercial use. As you know, we also swung into production on our first jet engine, the Turbo-Wasp. All told, we shipped more than 2,400 engines in 1949.

There was a lot of work, a lot of planning, and a lot of headaches involved in this manufacturing accomplishment. On the piston engines, for example, quantity orders by our customers for various models of engines fluctuated abnormally during the year, requiring repeated revision of our production schedules. Then too, we made thousands of design improvements in these production models, requiring new tooling and changes in manufacturing methods. On the jet engines, of course, we were plagued by all the inevitable troubles involved in putting any completely new product into production. Despite the problems, we delivered almost 7,000,000 horsepower in engines, and the equivalent of 40% additional horsepower in spare parts.

But the physical production of engines wasn't the only thing that happened at Pratt & Whitney during 1949. In fact, there wouldn't have been any production if those engines hadn't possessed the superior performance characteristics and the dependability that brought orders from our customers. So, an intensive engineering program of research, design, development and test has always been the mainstay of our progress at Pratt & Whitney. Out of it has already come the improved performance of our current types of engines. And out of it will soon come still better Pratt & Whitney engines to meet the rapidly advancing requirements of both military and commercial operators.

HOW MUCH ENGINEERING WORK DID WE DO LAST YEAR?

- ☐ 1 Million Man-Hours?
- ☐ 2 Million Man-Hours?
- ☐ 3 Million Man-Hours?
- ☐ 7 Million Man-Hours?



Last year, Pratt & Whitney engineers put in a total of nearly 10,000,000 man-hours of work. That's equivalent to the full time of one man working 50 weeks a year for 1,000 years! Amazingly, of course, no one man could ever do the work if he lived a million years. The engineering problems are so complex and varied that our engineering staff consists of designers, draftsmen, mathematicians, metallurgists, physicists and countless other specialists, each contributing his unique skill and knowledge to the solution of some part of the problem. To all this time and effort must then be added those millions of man-hours by expert craftsmen, working directly for the engineering department in tolerance, assembly and into the experimental parts and engines required for new designs.

HOW MANY DESIGN CHANGES WERE MADE DURING THE YEAR?

- ☐ 3,831?
- ☐ 11,417?
- ☐ 19,000?
- ☐ 52,000?



The design of an aircraft engine is never finished until the engine becomes obsolete and goes out of production. It must be constantly refined and improved — either to provide better performance, or to reduce manufacturing time and cost, or to correct problems encountered in actual service. Just to mention one example, we made 3,831 engineering changes in production models of Pratt & Whitney engines during 1949 — an average of 10 changes every working day. This included changes more than 15,000 drawings. And there are only the changes that applied to production models of engines. Beyond this, the engineering department changed an additional 11,417 drawings applying to spare-parts engines. Add to these figures the 21,357 brand-new drawings and changes before export for the experimental engines, and you get a grand total of more than 52,000 drawings that were either made or changed during the year — an average of more than 1,000 every week.

HOW MUCH EXPERIMENTAL TESTING DID WE DO IN 1949?

- ☐ 10,000 Hours?
- ☐ 18,000 Hours?
- ☐ 52,000 Hours?
- ☐ 70,000 Hours?



Every time a new part is designed, we have to make sure it will function properly. Every time we change an existing part we have to find out if the change produces the desired improvement. And every new operating method develops in service, we have to find out the reason for the trouble. This involves a continuous program of experimental testing both of individual parts and of completed engines. In addition to almost a thousand hours of flight testing, we carried out, for 1949, more than 70,000 hours of such experimental testing. This included more than 35,000 hours of testing of full-scale experimental engines and more than 35,000 hours of test-rundown testing of major components such as cylinders, bearings, turbines and compressors.



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AIRCRAFT**

EAST HARTFORD, CONNECTICUT



Whatever the Plane or Purpose . . .



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Every radio differs when it comes to Bendix Radio communication and navigation equipment—a difference based on differing performance under every conceivable flight condition in all parts of the world.



VERSATILITY

Being intelligent, Bendix Radio allows you to choose the equipment from a single radio system, the type of installation, or the combination of systems to suit your needs. Bendix Radio radio equipment is of standard design.



ECONOMY

For the pilot's part, Bendix Radio radio equipment is priced to give you security and peace of mind in every part of the world. Bendix Radio radio equipment is of standard design.



ADVANCED DESIGN

In the present defense program, Bendix Radio is engaged in testing its new systems to insure they are of the highest quality. Bendix Radio radio equipment is of standard design.

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Choosing dependable aircraft radio equipment is a lot like buying a diamond—unless you are an expert, it is just common sense to order from a source of proven quality. Nowhere is this proof more apparent than in the remarkable record of Bendix Radio . . . a record made possible by years of experience and specialization . . . by the tireless efforts of many of the world's finest research technicians and engineers . . . by the accuracy precision of modern production methods in

the largest, most up-to-date plant in the industry . . . and last, by the pilots themselves, who daily rely on Bendix Radio equipment in light planes and heavy aircraft over the world. The result has been, as you would expect, that more planes fly more miles with Bendix Radio than any other make. Whether you require a tiny battery-operated range receiver or a complete communication-navigation system, just look at the record and you'll buy Bendix Radio.

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Shoring carrier after work done partially loaded.



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Up or down they go...
quickly, quietly, easily... both sections
simultaneously... in each of these three 130 x 55 feet Truscon
Vertical Lift Canopy Door installations, at the United Air Lines Hangar,
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... conservation of building heat... these are special Truscon Vertical Lift
Door features that help develop hangar efficiency. The doors can be built
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AIR TRANSPORT

CAB Reports on Nonsked Crash

Investigation of Coastal Cargo Co. DC-3 accident indicates icing and crew sleepiness was cause.

For the second time in about two years, Civil Aeronautics Board safety investigators have issued a report suggesting that the pilots of a nonscheduled DC-3 were asleep prior to the crash of that plane.

Lastest accident involved a Coastal Cargo Co. DC-3 which crashed near Round Bay, Md., on Jan. 6, 1969, killing the pilot and co-pilot, the only occupants. Probable cause of the tragedy, CAB declared, "was loss of control of the aircraft, which resulted from ice on wing condition, turbulence and lack of alertness on the part of the crew."

As a result, the plane spun, and during the spin, or attempted recovery from the spin, severe aerodynamic buffeting caused failure of the left horizontal stabilizer and the elevator.

► **Knew Probable Cause**—CAB and the crew had only a 22-min period for rest prior to making the flight, but added that it could not be determined how much rest was actually taken by the pilot and co-pilot during the time available. The crew had previously been

for an unusually long period of 20 hr. 35 min., and, CAB asserted, the captain implicitly was known for sleeping on the cockpit.

(Regulations provide that a pilot must receive 24 hr. of rest before being assigned further duty after having flown more than 8 hr. during any consecutive 24 hr. period. They also specify that a pilot shall not be on duty for more than 16 hr. of any consecutive 24 hr.)

"Accordingly," the report continued, "the captain and possibly the co-pilot may have fallen asleep, or they may not slept enough to recognize and correct for an icing condition which became progressively more critical until controllability of the aircraft was lost."

The plane was equipped with automatic pilot, and it was emergency policy to use it in icing flight.

► **Plane Overloaded**—The report stated that the DC-3 was 44 lb. overloaded when it left West Palm Beach, Fla., for Boston with 6255 lb. of cargo. After refueling at Raleigh-Durham, N. C., the craft was 644 lb. overloaded and was still about 14 lb. overloaded when

it crashed. The latter overload was considered too small to be a factor in the accident.

The plane was not equipped with de-ice boots for the wings and empennage, but it did have pop-out anti-icing equipment. Civil Air Regulations effective at the time provided that pilots might be flown into icing conditions only if they were equipped with approved means for de-icing the "wings, propellers and such other parts of the aircraft as are essential to safety."

► **Barker Mishaps Recalled**—CAB's report recalled a mishap involving a nonscheduled Barker Air Transport DC-3 which crashed near Melbourne, Fla., July 18, 1947, killing 13 people, and the pilots in that instance. CAB found that the plane had flown over 23 hr. of the preceding 37 hr. 45 min. and that they had little opportunity for rest on the ground prior to starting the flight.

The Board said that there was no direct evidence to indicate that the pilots of the Barker DC-3 were asleep, "but under the circumstances it would be surprising if they did not fall asleep as the plane entered an automatic pilot in the early morning hours, gradually losing altitude." The Barker plane was overloaded by 2647 lb.—when it left Newark, N.J., for Boston. Investigation showed it also had a defective carburetor and spark plugs.

Findings Issued in Gander Accident

The crew's attempt to continue a landing approach using both GCA and visual reference to the ground under conditions of reduced visibility probably caused the TWA DC-8 accident at Gander, Newfoundland, last Mar. 2.

Civil Aeronautics Board report on the mishap states that there was no malfunctioning of the aircraft, engine or GCA equipment prior to or during the approach. But the landing was complicated by severe wind-shear sting.

Last spring an Air Line Pilot Association spokesman blamed GCA for the accident, claiming the pilot was not warned in an adequately low. The spokesman called for an investigation of GCA equipment limitations.

► **Hit Power Lines**—Bound from New York to Boston, the DC-8 struck power lines at least 33 ft. below the GCA glide path. The pilot was over 1600 ft. from the approach and the runway and only 13 ft. above the runway's elevation.

From a point 65 ft. beyond the power lines and for a distance of 150 ft. beyond the runway's left wing, fuselage and left main landing gear



AA 'PRESIDENT'S TROPHY'

American Airlines' pilots of southeastern section of U. S. coast company's President's Trophy for acquiring 1969 without accident record in injury to passengers or personnel. The 747 system and 161st effort flew an estimated 20 million miles in 1969/69 hours. President C. R. Smith,

second from right, is shown presenting award to Tom Ross, regional operations director, and H. L. "Bud" Clark, regional operations director of flight, at end of fifth annual event. (By Young, CAA administrator of the first region, is standing at right of American's president.)

forced the tips of steel trees. About 150 ft. from the point the right wing hit, the uncontrolled aircraft rolled and scraped along the surface for 60 ft., where it struck a mound. The impact bent the wing upward at an angle of about 45 deg., 1 ft. ahead of the tip.

Adjusted to the mound, the right main landing gear made a wide turn, 98 ft. long in the snow. The nose wheel did not touch the ground at any time.

► **Disaster Averted**—Despite the contact with the ground, which damaged the DC-4 substantially, the plane became fully airborne 3000 ft. from the end of the runway. It was blown to the airport and landed safely without injury to any of the 24 passengers or nine crew.

At the time the DC-4 was cleared to make a GCA straight-in approach, weather was 400 ft. ceiling, visibility two miles, with light freezing drizzle, light snow and fog. (Weather at both alternate airports was still above minima, but the captain chose to continue his GCA approach at Gaseville.)

► **Long Problem**—Windshield defects were turned on but soon had to be shut off when the deteriorated rubber and seal cracking compound allowed alcohol fumes to enter the cockpit through the windshield, creating a gas hazard. As a result, the windshield became covered with ice, impairing forward vision enough through an opening about one-fifth of the size of the left windshield as the plane left the ground.

The "clear view" windows, normally opened when cockpit visibility is obscured, was not cut because of a company restriction relating to danger from carbon monoxide fumes.

Visual contact with the ground was established at about 400 ft. while the plane was about two miles from the airport. Landing gear was lowered and flight preparations in landing of the DC-4.

► **Procedure Questioned**—Upon becoming contact, the captain decided to continue his approach by both visual

reference to the ground and by following GCA instructions. "This," CAB decried, "is not considered standard operating technique since the use of either method alone requires the undivided attention and alertness of the pilot."

Furthermore, the approved GCA procedure states that rapid reaching authorized minimums proceed in accordance with visual reference, or if unable to maintain visual reference, execute a prescribed manual approach procedure. Once the captain established contact, he did not again refer to the altimeter but relied entirely on GCA instructions for changes in altitude.

"This was not in accordance with approved procedure, as GCA is an approach and is specified minimums, and from this point on the pilot is solely responsible for safe operation of the aircraft. Since the captain did not cover gear and flaps until he was down on his approach—about 2 miles out—this may have caused the recorder of his approach on the flight path to be erratic."

The final rule of the approach was flown consistently low, and was reported to the flight by the GCA operator. Nevertheless, the plane's clearance was not fully corrected, and it struck the snow line."

CAB Permits NWA To Lower Cargo Rates

Northeast Airlines has asked Civil Aeronautics Board permission to establish specific commodity rates from Anchorage, Alaska, to Denver, U. S. points at the equivalent of 17 cents a ton mile and to set rates on volume commodities from the U. S. to Alaska that will yield about 10 cents a ton mile.

The low rates, representing a substantial reduction from present levels, are authorized for only a 90-day test period.

NWA had wanted even lower U. S.

Alaska cargo traffic. Much shorter of the same rates is to develop cargo traffic from NWA's closest link to the U. S. East Coast through Minneapolis to Anchorage.

Australian Airline Gets Poll Support

(McGraw-Hill World News)

Melbourne—After announcement of the third consecutive spending loss by Trans-Australia Airlines, the government-owned national air carrier, 45 percent of the people interviewed by the Australian Gallup organization still favored its staying in business, compared with 54 percent who said it should be wound up. The remaining 34 percent had no opinion. Most of those in favor thought that competition between the public and that TAA is a going good service.

Surprisingly, the proportion of those in favor was greater than in a similar poll a year earlier when the Labor government was in power. The new conservative government is pledged to make TAA pay its own way, but it was not indicated what it is going to do if the airline continues running up deficits. However, TAA's losses have been on a declining scale and there is a very prospect of the carrier showing a small profit this year.

TAA carried 521,000 passengers in 1959, compared with 401,000 in 1948. It is principal private competitor, with 100,000 in the same period, with bookings down to 596,000 from 624,000 in 1948.

Pioneer Still Leads Feederline Pack

Continuing as the ride of the nation's most prosperous feeder, Pan Am Air Lines earned a net profit of \$151,654 (\$1.68 a share) during 1959, compared with \$109,532 (\$1.32 a share) in 1958.

The carrier and its increased profits last year were attributable largely to a \$191,817 increase in passenger ticket air freight and express revenues over \$15,266 and charter revenues increased \$12,612.

Carrier's total operating revenue for 1959 was \$3,145,874. Net operating income before interest of \$117,558 in 1959 was \$269,243.

Using 11 DC-3s, PAA flew 104,112 passengers 74,291,533 revenue passenger miles in 1959 on 13 percent over 1958.

Operating expenses last year rose 79.37 cents a mile, against 79.86 cents in 1958.

The carrier's oldest feeder, Pioneer with complete 58th year of operation on Aug. 3.

EAL Miami Traffic Hits January Peak

Bad weather in many parts of the U. S. closing January resulted in spotty airline traffic trends.

United Air Lines Inc. an estimated 30,714,000 passenger miles during the month, down one-half of one percent from January, 1959, and 4.5 below the December, 1958, level. However, EAL's January, 1959, flight traffic was up 11 percent over the same 1958 month, capacity gained 15 percent and total rose 8 percent.

By the first of February, the carrier's passenger traffic also moved ahead in 1959 traffic. During unfavourable conditions, United between Jan. 1959 traffic should follow quite closely the pattern set in 1949.

► **EAL Record**—After a slow start, Eastern Air Lines had reported long-haul business on its route to Miami. During January, the company handled a record 46,994 passengers at Miami International Airport, 70% more than in the same month last year. EAL and competitors in Miami in February were looking for more traffic, indicating another good month.

Although played by flight at big and on terminals, Capital Airlines flew about 3 percent more revenue passenger miles in January, 1959, than in January, 1949.

FAWA Challenges TWU at PAA

The Civil Transport Workers Union's CIO contract covering some 4000 Pan American Airlines employees is under challenge by the Philadelpia Airline Workers of America.

FAWA is a new union organized by the left-wing leaders of TWU's

Pan American Local 106. A poll of the workers on their choice between the two unions is an ongoing matter. National Mediation Board intervention.

Loss of PAA would be a severe blow to TWU, since it would lose almost half its airline membership. It would also not lack. President Michael J. Quinn said Communist Party efforts to unionize.

TOW's contacts with PAA now maintain ground service, flight service and concourse personnel, grounds, flight info officers and port stewards.

IAM Opposes NWA 'Farm-Out' Plan

Flight of Northwest Airlines to "farm out" its operations, diversion and 5000-hr. overhaul shop work is involved as the strike threat of 1959 NWA employees who are members of the International Union of Marine Workers.

Strike risk among Northwest's mechanics from New York to Tokyo was taken the month before a strike can be called, however, approval must be given by IAM's General Lodge in Washington. Even then, the National Mediation Board is likely to intervene and delay a strike under Railway Labor Act provisions.

► **Union View**—Frank Hessler, coordinator of the union's affairs activities, asserts that NWA is violating a recent agreement that maintenance and shop work be done at Northwest's terminals. The union and general union work in NWA's mechanics who are in IAM.

Instead, the union charges, NWA is doing aircraft from its St. Paul headquarters, in Grand Central Air Terminal, Glendale, Calif., for overhaul, and for conversion of two planes to cargo. This is particularly distasteful to IAM because the union has spent some \$18,000, without success, trying

to organize Grand Central Air Terminal mechanics.

Northwest times it has violated its agreement with IAM. The union and NWA is looking about, definitely with other airlines over "farming out" on chemical work, but that no carrier has gone so far as Northwest.

Cruzeiro Will Fly Brazil-U.S. Routes

The Brazilian airline, Servicos Aereos Cruzeiro do Sul, Ltd., has moved a foreign air carrier permit from the Civil Aeronautics Board authorizing it to fly from Brazil to points in New York and Washington to consolidate stops at Trinidad, Puerto Rico and the Dominican Republic.

The authorities for Cruzeiro's new service is an accord with terms of a bilateral air transport agreement now in effect between Brazil and the U. S. Cruzeiro now owns two DC-4s which will be used initially on its new line.

Another Brazilian airline, Aerovias Brasilia, already has been authorized to operate to Miami and New Orleans but is presently serving only Miami.

TWA Plans More Holy Year Flights

TWA has announced plans to increase overseas flight frequency by twice New Year and Rome to 54 flights a week, effective May 1, for the accommodation of Holy Year travelers. Further steps are taken at the spring and in June, TWA will add flights to the number of weekly flights between the U. S. and Rome to 60 by summer.

Use Actual Passenger Weight, ALPA Asks

Air Line Pilot Assn. has announced that its objection to the use of average passenger weights in computing gross takeoff weights has brought pressure from the Civil Aeronautics Board and Civil Aeronautics Administration will be discussed with regulatory agencies governing control for scheduled carriers, particularly in regard to special flights.

ALPA said its complaint is based on the fact that average passenger weights established in a CAA safety regulation are less often varied considerably from actual passenger weights. Weights listed in the airline mean Average passenger weight, May 1 through Oct. 31, 1959, average passenger weight, Nov. 1 through Apr. 30, 1960, and average passenger weight for children from 3 to 12, 93 lb.

► **Overload Possible**—"It can be readily seen," ALPA protested, "that a great many flights are going out heavily over-



COMET'S FIRM FOOTING

De Havilland Aircraft Co. prototype Comet jet transport is shown here equipped with the four-wheel heavy main undercarriage nose wheel will be standard on production models.

duction models of the new British jetliner. The Comet, sporting its BAC-111 insignia, took its first flight during 1959, as the 188 days of its tests up to Dec. 31, 1959.



LONG AND SHORT OF IT

Tuscar Airlines, Indianapolis, became the only scheduled domestic carrier operating both jetliners and prop-typing equipment when it recently inaugurated Chicago-Pittsburgh-Indianapolis service with wide-body Lockheed Constellation. Gradually service with Boeings will be to

start this month, giving Tuscar a complete fleet of 875 more miles. The feeder has been operating as Indianapolis-Grand Rapids, Ind., but with DC-3s since November and hopes soon to be able to permit one of the larger planes over all its routes by summer.

STRICTLY PERSONAL

HOW NORTHWEST GOT A ROUND TRIPPER—When Richard Steele was in charge of the Twin Cities he got in a true story about a general newspaperman there, who sat them out of Dick's house. Now that's a true story, Dick is in New York and we've changed the name's name. We'll use the story before we decide whether to send it to the WCTU or one of the liquor interests for increasing air travel.

Every year Gamble-Skogmo put boxes (a large regional household department store chain) and St. Paul Pioneer Press & Dispatch put them get together for a mutual admiration party.

This party was of a nearby club in West Minneapolis. X. Y. Z. had been to another party before he went to this one. He had a few more and realized he was getting tired.

He took to the fresh air and his car, starting for home. But the streets are very winding in that part of Mpls. and soon he was lost.

"What to do?" He could talk with the boys in the squad or as the doctor, but that wasn't advisable. He'd wait for the first car that came along. It probably would take him somewhere he could recover his bearings.

So he followed the first car—for about two miles—and it turned into a driveway and went into a garage.

That was no good, but he was still lost. Better follow another car.

But that was no better. It turned into a garage down two blocks after he got behind it.

He got behind a third car and followed it a long while. Suddenly, after driving through the square, he burst into a lighted area and it was the terminal at Wood-Clayton Field.

The car he'd been following stopped before the terminal—and was standing fringed stopped right behind it. The people in the first car got out—luggage in hand. They began to talk with the porter on duty, pointing to one friend or another.

The porter came back and shook his head in the door. "Those people say you're been following them for the last four miles. Is that true, Mister?"

"Why no," replied the prominent newspaper executive. "I was just coming out to the airport to take a plane."

"Any luggage?"

"No. It's going to be a quick trip."

To keep up the front, he got out of the car and headed for the terminal, he was reasonably well up now. Inside, he thought he could maneuver himself out of his delicate situation. The people from the other car were watching him. He broke it.

He went up to the counter (the couple followed right along behind him, suspicious) and asked the clerk:

"Do you have a reservation in Chicago in the name of Zalko? My suitcase was to call today and make a reservation for me on this flight." The clerk looked long and hard. "I'm sure, Sir, but we don't have your name."

"Oh, well, the next I've forgotten. The suitcase does. That's all right. I can go home after that."

"Oh, no, Mr. Zalko, you can go right NOW. We have space available."

The couple left him before he was standing right behind him, their car catching every word. So no friend ended up being a plane ticket. And because it was plane time, he was advised to leave it—found the couple came right behind him.

He boarded, and flew to Chicago, sleeping most of the way. He caught the first plane back, a matter of minutes, and found his car still not there, the lights on and the motor running.

OPERATION KUMON—H. E. Weisner, who operates an aircraft consulting service in Washington, writes a new problem for aircraft designers that makes use of the null hypothesis objectives look easy.

"Having now gone well beyond the speed of sound, the next goal of aviation should be the production of a plane that will exceed the speed of remembrance. That should be no difficult feat as it is known that remembrance has reached fantastic speeds propelled by such a very small amount of fuel as:

"Some experts think the 'Young Steamers' that recently arrived with excitement may have been late model remembrance going plans. For they had many of the same characteristics: origins unknown, shape and construction difficult to define, speeds fantastic, and no passenger ever caught up with one."

—R.I.W.

WHAT'S NEW

New Books

"Engineering Supersonic Aerodynamics" by E. Arthur Sawyer presents practical applied aerobical research in understanding this field, also the necessary materials for designing and predicting performance of supersonic aircraft. Results of latest applied theoretical work of many authors are given, permitting the reader to obtain aerodynamic coefficients for practical wing and tailplane shapes currently being used in high-speed planes.

Fundamental relations of one-dimensional flow are derived and discussed and serve as an introduction to the use of the level method and design and use of defences. Problems are given throughout the volume to illustrate the use of the material presented.

The author is project supervisor, aerodynamics and control group, applied physics laboratory of Iowa Institute of Technology. Published by McGraw-Hill Book Co., Inc., 110 W. 42 St., New York 15, N. Y., 264 pages, \$4.00.

"Airship Structures" by David J. Peay gives complete basic theory with primary emphasis on fundamental structural theory that will remain constant regardless of materials and construction methods. The book can be considered as an undergraduate college text, with many examples placed on the application of elementary principles of the mechanics of aircraft structures.

Included are chapters on equilibrium of forces, static structures, statically indeterminate structures, and special methods of analysis. The writer is chairman of department of aeronautical engineering, Pennsylvania State College. Published by McGraw-Hill Book Co., Inc., 110 W. 42 St., New York 15, N. Y., 166 pages, price \$4.50.

"Public Relations in Management" by J. Hardy Wright and Byron H. Christian serves the dual purpose of being a textbook for the student who hopes to make a career in the field and as a guide for the executive and supervisor in business and industry.

The authors define modern public relations as "a planned program of policies and conduct that will build public confidence and increase public understanding." The "public" embraces employer, stockholders, customers, neighbors surrounding the factory and government. Here is presented information this public is presented in this volume with simplicity and readability.

Published by McGraw-Hill Book Co., Inc., 110 W. 42 St., New York 15, N. Y., 129 pages, price \$3.25.

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Weeping for the Rails

A new and surprising lot of unsolicited public relations checks of your train for the railroad and their plight. It indicates a big chunk in the current argument that the rails have learned their lesson in public service and public relations.

To transportation people it will be no surprise that the magazine of the Federation of Railway Progress broadcasts the incident. This glossy organization is the brain child of that stalwart, vocal critic of antique railroading, Robert R. Young. As far as we know, the only railroad member of the Federation are the three roads Mr. Young virtually controls.

The February issue of *Railway Progress*, the glossy interesting and audacious magazine, carries a factually soiling report on the inadequate passenger service between Portland and Seattle. The writer is a Portland newspaperman who also happens to be a public figure, a member of the Oregon State Senate.

Portland has 465,000 persons. It is 186 miles south of Seattle, largest city in the area, with about 500,000 population. Although the state of Washington has increased 48 percent in population since 1940 and Oregon 59 percent, the train service is exactly the same as a decade ago—four round trips a day. Presumably all local traffic has been deflected to the buses.

"If there is any part of America more neglected from the standpoint of intercity train service than the Pacific Northwest, only the Lark telescope could locate it," the writer declares.

Despite mushrooming population, increasing schedules of bus lines, a fine network of well-served airlines, an almost water-level stretch of well-inflated truck and little if any extreme weather the year around, the three railroads between Portland and Seattle still represent what amounts to 1922 schedules with 1922 equipment.

Meanwhile, the state of Washington has decided to spend millions of dollars in tax funds to widen the highway to four lanes, which the railroads complete by subsidizing the buses with the public treasury.

As one state service and, "The railroads have abandoned local passenger traffic to the buses. They've virtually pushed the people out on the highways."

Then the three railroads appear to be letting history repeat itself. This is similar to what happened all over the country when the railroads failed to keep up with the march of progress. Here appears to be a shut-back on history that makes it difficult, indeed, to believe that buses "took" business away from the rails. The rails threw it away fast.

The fact that the three railroads in this area operate the truck segment in a pool may be a tip-off. A few

words on pooling may interest some people—including those in the non-rails.

"Like a person, a railroad enjoys credit for what it accomplishes. This is difficult when services are pooled. Tickets are interchangeable. The train is divided in ownership. Unless a passenger uses the train, he is unlikely to know which company is transporting him. This hardly encourages a railroad to put forth its all."

We might add that pooling can also encourage mediocrity and "economies" by making the identity of the company that dare to fast such "service" on the public. Money loves company.

Two months before the article was to appear, the editor of *Railway Progress* sent copies to the chief executives of the three railroads, suggesting comment. Northern Pacific's president wrote that he did not care to offer any. Great Northern's president, ditto. Union Pacific's president did not write at all.

Such incidents are worth quoting the next time we are tempted to weep for the unfortunate railroads, their loss of the vibrancy of public highway "subsidies" for buses, the plights of similar competition from other modes that really offer public service, and their plights that they do not have the opportunity to tell their side of the story to the public.

(Three railroad chief executives show they are dead on their feet, public relations want. One such article, and three such presidential refusals to comment on facts, can counteract the effect of no one knows how many carefully written press releases issued by the Association of American Railroads in Washington, where good public relations is practiced. Maybe all of this is his a lesson to certain airline presidents, too.)

Safe Air Shows

Spring is not for safety. There come summer and fall air shows. It is not too early to reserve a campaign for sensible air shows that sell—not kill—safety.

We are still hearing from readers about AMERICAN Wreck's editorial campaign on this subject last fall. FRANK T. Fox, manager of Worcester (Mass.) Municipal Airport, says:

"Since you kind mention of our Worcester Air Show in your Nov. 7 issue I have been worried with inquiries. The terrific curiosity of aviation people all over the country about a safe and sane air show indicates it is time for a change in the make-up of these affairs."

"Many thanks for the mention in your editorial and more power to you in your crusade for aviation safety."

Stunts and dangerous stunts at air shows can kill more than the participants or bystanders. They are mass production killers of the public's confidence in commercial aviation.

—Robert H. Wood

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